Analisis de la relacion coste-efectividad de un programa de autotransfusion en cirugia protesica primaria de rodilla y cadera [Cost-effectiveness analysis of an autotransfusion program in primary knee and hip replacement surgery]
Diaz-Espallardo C, Moral-Garcia V

Record Status
This is a critical abstract of an economic evaluation that meets the criteria for inclusion on NHS EED. Each abstract contains a brief summary of the methods, the results and conclusions followed by a detailed critical assessment on the reliability of the study and the conclusions drawn.

Health technology
The use of an autotransfusion programme in patients undergoing primary prosthetic surgery of the knee and hip (both cemented and non cemented). The programme included preoperative donation as the main technique and postoperative blood salvage from drains as a secondary approach. A combination of both techniques was also performed.

Type of intervention
Treatment.

Economic study type
Cost-effectiveness analysis.

Study population
The study population included patients undergoing primary prosthetic surgery of the knee and hip, who were aged between 18 and 80 years, and who were classified as ASA I to III with haemoglobin (Hb) levels of at least 11 g/dL or a haematocrit (Hto) value of at least 34%. A detailed list of the exclusion criteria was provided.

Setting
The setting was a hospital. The economic study was carried out at the Servicio de Anestesiologia, Corporacion Sanitaria Parc Taulli in Sabadell, Barcelona, Spain.

Dates to which data relate
The effectiveness and resource consumption data were collected in 1993 (retrospective analysis) and in 1995 and 1996 (prospective analysis). The price year was 1997.

Source of effectiveness data
The effectiveness data were derived from a single study.

Link between effectiveness and cost data
The costing was performed both retrospectively and prospectively on the same sample of patients as that used in the effectiveness study.

Study sample
A sample of 356 patients was enrolled in the study. There were 131 patients in the control group and 225 in the intervention group. The method used to select the sample was not reported, and neither was the use of power
In the control group, 57 patients underwent primary prosthetic surgery of the knee (PSK), 40 underwent primary prosthetic surgery (cemented) of the hip (PSH-C) and 34 underwent primary prosthetic surgery (non cemented) of the hip (PSH-NC). The patients were aged 68 (+/- 6) years in the PSK group, 70 (+/- 4) in the PSH-C group and 54 (+/- 11) in the PSH-NC group. There were 14 men in the PSK group, 12 men in the PSH-C group and 22 men in the PSH-NC group.

In the intervention group, 136 patients underwent PSK, 45 underwent PSH-C and 44 underwent PSH-NC. The patients were aged 69 (+/- 6) years in the PSK group, 72 (+/- 7) in the PSH-C group and 61 (+/- 8) in the PSH-NC group. There were 36 men in the PSK group, 14 men in the PSH-C group and 28 men in the PSH-NC group.

**Study design**
This was a historical cohort study, where data for the intervention group were prospectively collected and data concerning the control group were retrospectively gathered. Randomisation was not carried out. The patients were followed until discharge from hospital and no loss to follow-up was reported.

**Analysis of effectiveness**
The health outcomes used in the analysis were:

- the values of Hb and Hto at baseline, after the surgical operation, after 24 hours, after 48 hours and at discharge;
- indicators of postoperative recovery and complications;
- the prevalence of exposure to homologous blood;
- the units of packed red cells from homologous blood;
- the length of hospital stay;
- the number of preoperative donations and the combination of preoperative donations and postoperative blood salvage from drains (or combinations of both techniques) among intervention patients; and
- the index of re-infusion of autologous units within preoperative donation and the combination of preoperative donation and postoperative blood salvage from drains among intervention patients.

All of the patients included in the study were accounted for in the effectiveness analysis. The study groups were similar at baseline, with the exception that there were significantly younger patients in the control study among those who underwent PSH-NC. The team performing the surgical operations was comparable between the intervention and control groups.

**Effectiveness results**
The Hb and Hto values were different between the control and intervention groups at several assessments. However, at discharge, only the Hb value in the group of patients who underwent PSH-NC was significantly lower in the intervention group (10.5 +/-1.1 g/dL) than in the control group (11.4 +/-0.9 g/dL), (p<0.05).

The indicators of postoperative recovery and complications were comparable between the study groups.

The prevalence of exposure to homologous blood fell from 43.8% in the control group to 11.6% in the intervention group (odds ratio, OR 0.16) for PSK, (p<0.001), from 75 to 17.4% (OR 0.07) for PSH-C, (p<0.001), and from 73.5 to 15.2% (OR 0.06) for PSH-NC, (p<0.001).

The units of packed red cells from homologous blood fell from 0.9 (+/- 1.1) in the control group to 0.2 (+/- 0.5) in the
intervention group for PSK, (p<0.001), from 1.4 (±/ 1) to 0.3 (±/ 0.6) for PSH-C, (p<0.001), and from 1.8 (±/ 1.3) to 0.3 (±/ 0.8) for PSH-NC, (p<0.001).

The length of hospital stay decreased significantly in the intervention group (data not reported).

Among the intervention patients, there were 21 preoperative donations, 91 cases of postoperative blood salvage from drains, and 24 combinations of both techniques for PSK. There were also 45 preoperative donations for PSH-C, and for PSH-NC, 24 preoperative donations, 6 cases of postoperative blood salvage from drains, and 14 combinations of both techniques.

Finally, again for the intervention patients, for PSK the index of re-infusion of autologous units was 52.4% with preoperative donation and 37.5% with combined preoperative donation and postoperative blood salvage from drains. The index was 74% with preoperative donation for PSH-C, and for PSH-NC, 90% with preoperative donation and 56.8% with combined preoperative donation and postoperative blood salvage from drains.

Clinical conclusions
The effectiveness analysis proved the effective reduction of the prevalence of exposure to homologous blood.

Measure of benefits used in the economic analysis
No summary benefit measure was used. A cost-consequences analysis was therefore carried out.

Direct costs
The categories of costs included in the analysis were the use of autologous blood and the consumption of packed red cells. The perspective of the study appears to have been that of the hospital. The unit costs were reported separately from the quantities of resources used. The costs were reported in 1997 values. The costs were estimated from actual wholesale prices for blood products. Resource consumption was assessed on the patients who were included in the effectiveness study. The use of a discount rate was not reported and it was unclear whether it would have been relevant.

Statistical analysis of costs
No statistical analyses of the costs were carried out.

Indirect Costs
The indirect costs were not included.

Currency
Spanish pesetas (Pta).

Sensitivity analysis
No sensitivity analysis was carried out.

Estimated benefits used in the economic analysis
See the 'Effectiveness Results' section.

Cost results
In the control group, the average costs were Pta 10,338 for PSK, Pta 16,065 for PSH-C and Pta 20,655 for PSH-NC.
In the intervention group, the average costs amounted to Pta 18,269 with preoperative donations, Pta 20,960 with postoperative blood salvage from drains and Pta 35,099 with combinations of both techniques for PSK. The corresponding costs were Pta 19,761 (preoperative donations) for PSH-C, and Pta 19,990 (preoperative donations), Pta 23,715 (postoperative blood salvage from drains) and Pta 36,705 (combinations of both techniques) for PSH-NC.

Synthesis of costs and benefits
Not relevant as a cost-consequences analysis was conducted.

Authors’ conclusions
The main conclusion of the study was that the autotransfusion programme was effective in reducing the exposure to homologous blood in patients undergoing primary prosthetic surgery of the knee and hip (both cemented and non cemented). The autotransfusion programme led to a reduction in the costs when compared with the standard transfusion policy before the introduction of the new programme.

CRD COMMENTARY - Selection of comparators
The comparator used in the analysis was the standard autotransfusion programme for patients undergoing primary prosthetic surgery of the knee and hip, which was implemented before the introduction of the new autotransfusion protocol. However, details on the previous autotransfusion policy were not reported. You should decide whether it represents a valid comparator in your own setting.

Validity of estimate of measure of effectiveness
The analysis used a historical cohort study. This may have been inappropriate for the study question since the lack of randomisation could have led to selection bias. The fact that the control group was retrospectively selected and estimated may result in other contingent factors affecting the study results. Thus, the impact of the new autotransfusion programme may not have been appropriately assessed. Further, the method of sample selection was not reported and it was not stated whether any eligible patients refused to participate in the study. A strength of the study was that study groups were comparable at baseline, with age being the only characteristic that was statistically different. However, age does not seem to have represented a confounding factor. The sample of patients included in the effectiveness analysis appears to have been representative of the study population.

Validity of estimate of measure of benefit
No summary benefit measure was used.

Validity of estimate of costs
The analysis included the costs strictly related to the blood products used during the surgical operation. Thus, it was unclear whether the interventions had an economic impact on other categories of costs, such as personnel or fixed hospital costs. The unit costs were analysed separately from the resource use and the price year was reported. These factors facilitated the replication of the study in other settings. The costs were treated deterministically and sensitivity analyses were not performed. The cost estimates were specific to the study setting. The authors did not discount the costs and the relevance of discounting was unclear.

Other issues
The authors noted that their findings confirmed those from a prior study. However, the issue of the generalisability of the study results to other settings was not addressed. The costs were reported separately from the quantities of resources, but no sensitivity analyses were performed. Thus, the external validity of the analysis was low.

Implications of the study
The study suggests that an autotransfusion programme may be both effective in reducing the exposure to homologous blood and efficient in economic terms, in patients undergoing primary prosthetic surgery of the knee and hip (both cemented and non-cemented). The key factor of the programme's success was the selection of the autotransfusion technique more appropriate for the patient's characteristics.

**Source of funding**
None stated.

**Bibliographic details**

**PubMedID**
10613077

**Indexing Status**
Subject indexing assigned by NLM

**MeSH**
Aged; Arthroplasty, Replacement, Hip; Arthroplasty, Replacement, Knee; Blood Transfusion, Autologous /economics; Case-Control Studies; Cost-Benefit Analysis; Female; Humans; Male; Program Evaluation; Prospective Studies; Retrospective Studies

**AccessionNumber**
22000006076

**Date bibliographic record published**
31/08/2003

**Date abstract record published**
31/08/2003